

Capital Expenditures by Manufacturing Industries in the Postwar Period

Summary

MANUFACTURERS' investment in productive facilities since 1945 has about equaled the book value of their gross capital assets at the beginning of the period. Even after allowing for the rise in the price level and higher replacement costs, new facilities installed since 1945 account for a large portion of the current stock of manufacturers' fixed capital.

The new data by manufacturing groups here presented for the first time show that the largest capital expansion relative to the book value of gross capital assets at the end of World War II occurred in industries producing motor vehicles, electrical machinery, and chemicals. The smallest relative increase occurred in basic and fabricated

metals; the rubber and food industries also had below average rates of expansion. There was a fairly close relationship among manufacturing industries between the relative size of the postwar expansion and the postwar rate of return on invested capital.

Large, medium and small concerns have all shared in this basic expansion.

By late 1951, only defense and defense-supporting industries were continuing to show increases in investment rates. These outlays are being stimulated by the more than \$3 billion of proposed facilities certified to manufacturers under the rapid tax amortization program—of which only one-third will be in place at the end of this year.

In the present phase of the mobilization program particular attention has been focused on plant and equipment programs of business. This interest arises not only out of the necessity for increasing productive capacity in defense and defense-supporting industries but also from the impact of investment on economic stabilization and scarce materials.

Although information has been available on the capital outlays by major industry groups, viz, manufacturing, the electric and gas utilities, transportation, mining and commercial companies, adequate evaluation of these outlays has been hampered by the lack of a current breakdown and continuous data within the manufacturing sector—especially as between defense and nondefense areas. This sector alone has accounted for close to half of all capital outlays by business.

The new estimates of expenditures for new plant and equipment by major manufacturing groups cover actual outlays from 1945 to the third quarter of this year and outlays planned by business during the fourth quarter of 1951 and the first quarter of next year. The new data form an integral part of the regular quarterly and annual surveys of nonagricultural business expenditures for new plant and equipment conducted jointly by the *Office of Business Economics* and the *Securities and Exchange Commission*. The estimates for capital outlays by all nonagricultural business after incorporating the new manufacturing data are shown in table 1.¹

Revision in total manufacturing series

The revised estimates for total manufacturers' outlays differ from the old series in that they are adjusted to the

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¹ In aggregate, the estimates introduced in this article represent a revision of previously published estimates for the manufacturing sector—a first step in a planned revision of every industrial group in the survey based on additional sample data and new estimation procedures.

gross capital assets and industrial classification of corporations as reported to the Bureau of Internal Revenue during the 1948 tax year rather than during the 1940 tax year. More importantly, the new series utilize the mandatory annual reports of essentially all manufacturers registered with the Securities and Exchange Commission rather than only those reporting in the plant and equipment quarterly survey. In both the new and old series the registered corporations are supplemented by the *Office of Business Economics'* sample of nonregistered companies. The new series also utilizes more refined estimating techniques as well as an adjustment for biases arising out of changes in the business population.

It should be noted that some of the difference in movement between the new and old manufacturing estimates may be offset when the nonmanufacturing industries are adjusted to the new benchmark. This may be especially true in mining, and more particularly in nonferrous metals, where the use of the new Bureau of Internal Revenue universe results in the classification as mining companies of a few leading refiners with large mining activities. For some purposes, it may be desirable to group together corresponding manufacturing and mining industries, and such combinations will be presented in the forthcoming revision of the nonmanufacturing series.

The new manufacturing estimates are based on expenditures for plant and types of machinery and equipment for which the reporting company maintains depreciation accounts. Since these estimates refer to purchases of capital goods by the users and exclude capital outlays charged to current expenses, they differ from those obtained by the commodity-flow approach which utilizes output data to measure purchases of capital goods by type rather than by ownership, and where the distinction between current and capital account is based on type of item rather than on business practice. The present manufacturing series also

exclude new capital goods leased by manufacturers from nonmanufacturers. A fuller description of the series and their comparability to other related published series appears in the technical notes to this article.

Capital goods outlays in the postwar period

At the end of World War II, manufacturers were faced with an unprecedented demand for both consumers' and producers' goods. A substantial part of their productive capacity, however, was geared to war goods output—while their civilian goods plant was depleted by the forced disinvestment during the war years.

As a result, the early postwar years were characterized by rapidly mounting investment in fixed assets—with the avail-

of surplus facilities from the Government. While capital goods costs rose steadily and sharply throughout this period, the rate of new physical additions to productive capacity in 1947 was two-thirds higher than in 1945.

The rate of increase in manufacturers' expenditures for new plant and equipment slowed markedly in 1948 to slightly over 5 percent from the previous year, primarily reflecting increases in prices. Outlays reached a plateau in late 1948 and early 1949 and then turned downward—the decline continuing through early 1950. While such factors as reduced earnings and orders played some part in the reduction of one-fifth in fixed investment in 1949, a major factor probably was the elimination of a large part of the backlog demand for plant and equipment. Although fixed investment is recognized as more volatile than over-all activity, it may be noted there was only a negligible decline in total gross national product and in manufacturing sales from 1948 to 1949 (less than 1 percent each).

Expenditures in 1948, totaling \$9.1 billion, were more than four and one-half times the capital outlay of \$1.9 billion in 1939 (see table 2). The dollar value of manufacturers' sales and profits after taxes in 1948 were, respectively, 3.4 and 3.9 times their 1939 rates. Adjusting for the roughly 75 percent rise in capital goods prices, the increase in the volume of additions in 1948 above 1939 was about 170 percent, or double the rise in the physical volume of manufacturing output.

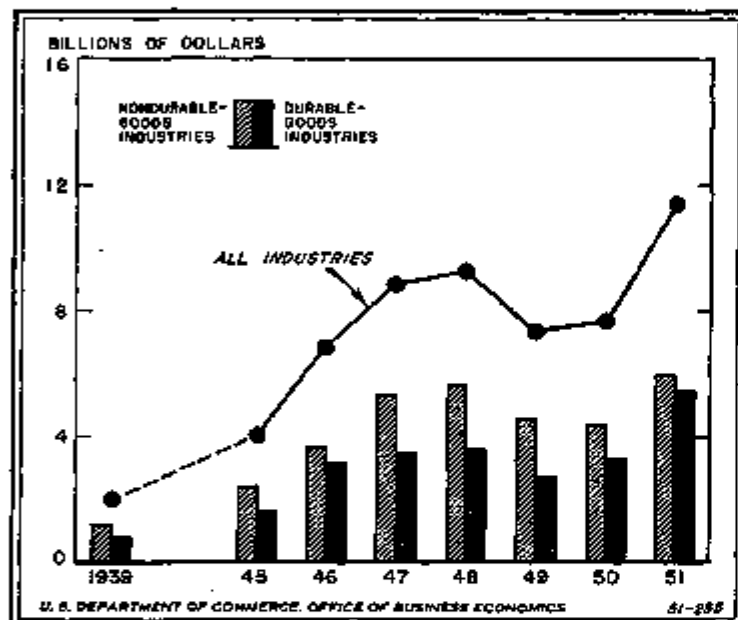
The outbreak of Korean hostilities in mid-1950 introduced a new urgency into manufacturers' investment plans. Investment decisions were influenced not only by the additional capacity which would be required to meet the expected increases in both civilian and military demand, but also by the realization that investment would soon be limited by the materials situation. As a result, manufacturers' outlays increased sharply in the second half of 1950 to a new peak. This rise in outlays has continued through the third quarter of this year and in aggregate is anticipated by manufacturers to reach a peak rate in the fourth quarter of 1951 and (after seasonal adjustment) in the first quarter of 1952.

Manufacturers' 1951 investment programs

Manufacturers expect to spend \$11.1 billion on new plant and equipment in 1951, or 49 percent more than in 1950. Despite sharp rises in capital goods costs, the physical volume of additions in 1951 will be almost two-fifths higher than in 1950, while the rate in the final quarter of this year will be four-fifths higher than in the immediate pre-Korean period.

To a large extent, the magnitude of the 1950 to 1951 changes in fixed investment among the various industries appeared to be related to the degree of participation in the

Chart 1.—Manufacturers' Expenditures for New Plant and Equipment¹



¹ Data exclude capital outlays charged to current account. Figures for 1951 include fourth quarter expenditures anticipated by business in late October and during November.

Sources of data: U. S. Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

ability of capital goods the major limiting factor. Manufacturers' expenditures for new plant and equipment almost doubled from the first to second half of 1945. Outlays rose by 70 percent from the full year 1945 to 1946 and then increased by another 30 percent in 1947 (see chart 1). In addition, manufacturers in 1946 purchased about \$1 billion

Table 1.—Expenditures on New Plant and Equipment by United States Business, 1945-51¹

(Millions of dollars)

Item	1945	1946	1947	1948	1949	1950	1950				1951	
							January-March	April-June	July-September	October-December	January-March	April-June
Manufacturing.....	3,053	6,790	8,788	8,134	7,149	7,491	1,444	1,714	1,850	2,474	2,154	2,806
Mining.....	413	557	690	802	738	584	146	150	180	106	183	228
Railroad.....	552	873	900	1,310	1,380	1,135	222	208	250	320	303	412
Other transportation.....	321	646	708	700	825	437	70	90	123	146	125	136
Electric and gas utilities.....	680	1,043	1,807	2,083	3,140	3,767	653	758	821	905	788	883
Commercial and miscellaneous ²	1,477	2,393	4,429	5,294	3,119	4,017	1,066	1,163	1,244	1,446	1,345	1,457
Total.....	7,496	13,055	17,420	20,032	18,021	17,831	3,019	4,143	4,512	5,017	4,963	6,913

¹ Data exclude expenditures of agricultural business and outlays charged to current account.

² Data include trade, service, communications, construction, and finance.

Sources: U. S. Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

Table 2.—Manufacturers' Expenditures for New Plant and Equipment, by Industry, 1939 and 1945-51¹

(Millions of dollars)

Industry	1939	1945	1946	1947	1948	1949	1950	1951 ²
Total manufacturing.....	1,043	3,963	6,799	8,703	9,134	7,149	7,491	11,141
Durable goods industries.....	768	1,590	3,112	3,497	3,360	2,893	2,135	5,213
Primary iron and steel.....	129	196	500	638	772	598	599	1,310
Primary nonferrous metals.....	30	24	83	178	193	151	134	312
Fabricated metal products.....	91	218	358	370	343	271	350	430
Electrical machinery and equipment.....	40	123	222	304	339	216	245	355
Machinery except electrical.....	106	318	511	519	557	383	411	678
Motor vehicles and equipment.....	133	368	591	504	474	318	310	797
Transportation equipment excluding motor vehicles.....	42	55	109	95	108	57	82	227
Stone, clay, and glass products.....	71	100	241	325	260	181	280	380
Professional and scientific instruments.....	(3)	81	50	67	61	56	72	95
Other durable goods industries.....	118	234	360	406	419	304	452	672
Nondurable goods industries.....	1,187	2,373	3,678	5,206	5,851	4,255	4,356	5,928
Food and kindred products.....	205	337	513	689	721	620	628	631
Beverages.....	38	97	167	277	352	348	237	209
Tobacco manufactures.....	11	6	25	44	56	38	29	54
Textile mill products.....	130	209	342	510	618	471	430	676
Paper and allied products.....	57	110	232	371	353	258	327	494
Chemicals and allied products.....	176	375	800	1,000	941	670	771	1,218
Petroleum and coal products.....	403	879	1,087	1,730	2,100	1,780	1,582	2,040
Rubber products.....	38	118	139	143	162	81	169	187
Other nondurable goods industries.....	113	265	380	480	308	333	330	281

¹ Data exclude capital outlays charged to current account.² Data for the fourth quarter based on anticipated expenditures reported by business during late October and November.³ Included in other durable goods industries in 1939.⁴ Include lumber products, furniture and fixtures, ordnance and miscellaneous manufactures. Also include instruments in 1939.⁵ Include apparel and related products, leather and leather products and printing and publishing.

Sources: U. S. Department of Commerce, Office of Business Economics and Securities and Exchange Commission.

mobilization program. Thus only industries which are almost completely engaged in nondefense activity, such as apparel, furniture, and printing and publishing, did not increase their capital outlays from 1950 to 1951. On the other hand, the largest relative increases during this period were among those groups most closely related to defense output: nonautomotive transportation equipment (180 percent), primary nonferrous metals (135 percent), and primary iron and steel (120 percent). Capital outlays by other defense-supporting industries also increased, with rubber up 85 percent in 1951, while chemicals and petroleum expanded by 65 and 30 percent, respectively.

Examination of the quarterly data indicates that the major area of expansion in the latter part of 1951 was in the defense and defense-supporting industries. All of the metals fabricating industries, as well as producers of petroleum, chemicals and rubber products, were anticipating peak rates of expenditures in the final quarter of the year. With the exception of stone, clay and glass, all the remaining industries were showing declining rates by the end of the year.

The falling investment by industries not closely related to the defense effort is only partly due to demand factors. While the continued reduced rate in consumers' goods demand from that earlier in the year undoubtedly discouraged some investment, Government policies in the allocation of critical materials and in limiting construction may well be more restrictive factors currently.

The defense industries, on the other hand, not only are in a better sales and orders position but their investment programs have higher priorities in materials allocations and are stimulated by the various governmental aids to facilities expansion. Certificates of necessity awarded to manufacturers under the rapid tax amortization program currently cover proposed investment of about \$3 billion. Plants in the metals fabricating industries account for about \$5 billion, while petroleum and chemical companies have somewhat over \$2 billion of facilities certified. Since only about one-third of these expansion programs will be in place at the end of the year, these defense and defense-related indus-

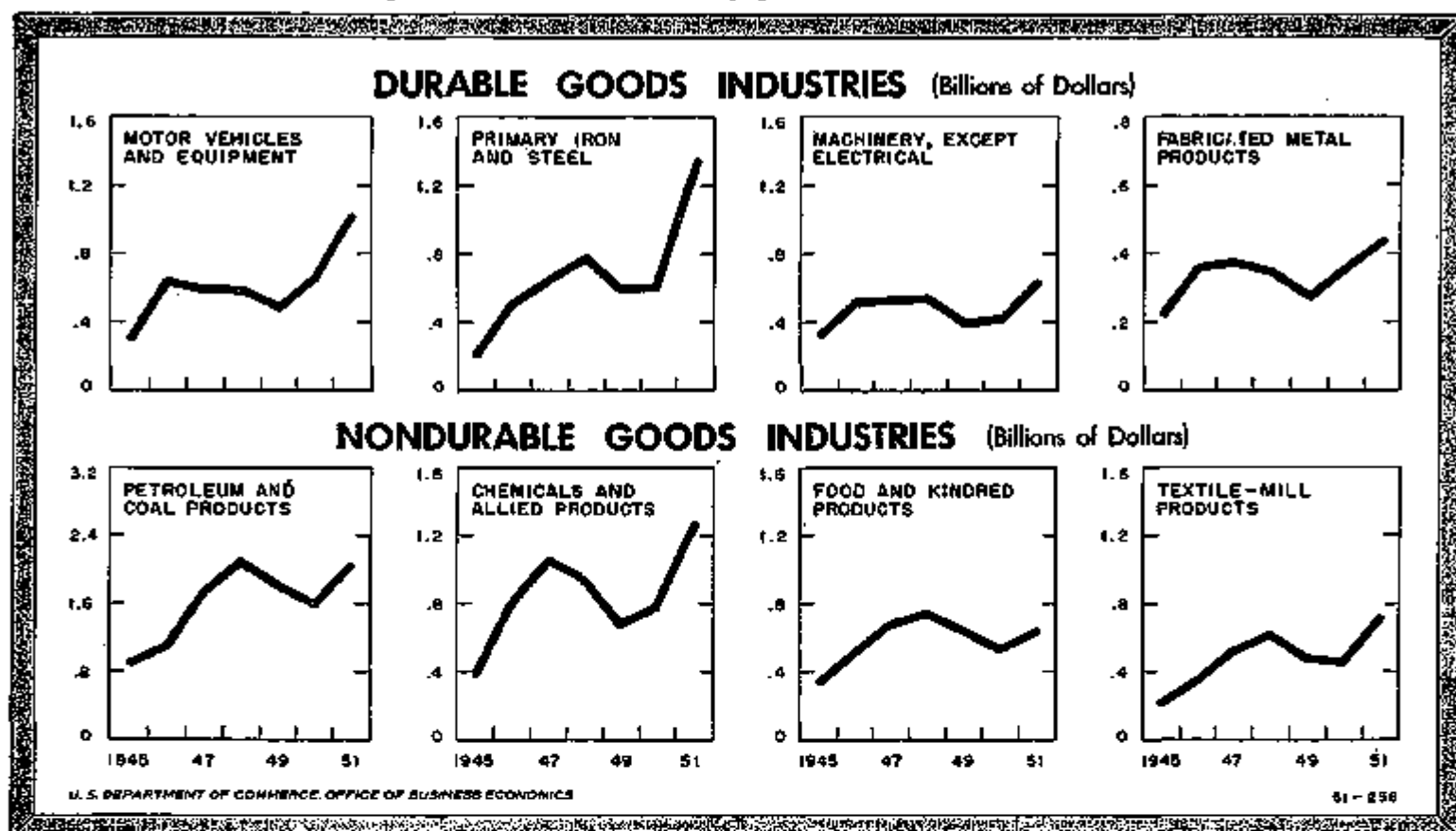
tries are a significant area of strength in the short-run investment picture.

Relation to fixed assets

Although an imperfect measure, some insight into the size of the postwar expansion in manufacturing facilities is afforded by comparison with the book value of gross capital assets at the end of 1945. Such data are available only for corporations which, however, account for the great bulk of the total.

In the five years 1946 through 1950, corporate manufacturers' expenditures for new plant and equipment totaled \$37.2 billion (about 96 percent of the total for all manufacturing) compared to \$52.5 billion of gross capital assets at the end of 1945 and \$23.3 billion of net capital assets. By the end of 1951 an additional \$11 billion will be expended by corporations for new capital goods.

Thus the plant and equipment expenditures by corporations since 1945 have approximately equaled the book value of corporate gross capital assets at the beginning of this period. Making rough allowance for the different prices reflected in the book values and postwar outlays, and adjusting to a common base, the gross capital assets at the end of 1945 amounted to an estimated \$62 billion in 1945 dollars as against about \$35 billion of expenditures in 1945 dollars in the 1946-51 period. If both figures are adjusted for gross retirements since 1945, it appears that approximately two-fifths of the current gross stock of fixed capital is less than six years old. This ratio is subject to a substantial margin of error in view of the inadequacy of price deflators both for postwar capital expenditures and particularly for the stock of capital goods at the end of 1945. There is reason to believe that the real stock of capital at the end of 1945 is somewhat understated by the procedures used. Since an estimate of net stock of capital would be subject to even larger errors, no further adjustment has been made in the gross ratio to determine the proportion of the current net stock of manufacturing fixed investment attributable to additions since World War II.

Chart 2.—Manufacturers' Expenditures for New Plant and Equipment: Selected Durable and Nondurable Goods Industries¹

¹ Data exclude capital outlays charged to current account. Figures for 1951 include fourth quarter expenditures anticipated by business in late October and during November. Sources of data: U. S. Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

The comparison of postwar capital outlays (in current dollars) and the book value of gross capital assets is shown in table 3. It may be noted that the expansion from 1946 through 1950 exceeded the book value of gross capital assets at the end of 1945 in the motor vehicles, beverages, and electrical machinery industries. By the end of 1951, the industries whose postwar expansion will exceed their gross fixed assets at the end of World War II also include non-electrical machinery, chemicals, textiles and stone, clay and glass.

Relation to return on invested capital

A major determinant of investment decisions is the expected rate of return on investment. In view of the relatively long period required to recover the original cost and the calculated return above that cost, these expectations involve fairly long-term projections of economic conditions. Although it is not possible to quantify these expectations by businessmen either by industries or in aggregate, some insight may be gained by comparing the magnitude of the postwar expansion in each industry with that industry's return on investment. This procedure implicitly assumes that businessmen's current experience is given important weight in their anticipation of future return.

The data used for this purpose are the ratio of expenditures in the 1946-50 period to gross fixed assets at the end of 1948 and the average return (after taxes) on invested capital in the 1946-50 period. It should be noted that gross capital assets at the end of 1948 were used to insure industrial comparability in the data, and that the use of gross capital assets at the end of 1945 would not materially change these results.

It should also be noted that the use of gross fixed assets as a measure of the stock of capital presents several problems including pricing and the appropriateness of gross rather than net assets. Also the use of book value of invested capital may not only understate the replacement cost of such capital during this period but more importantly may affect the various industries differently.

When the industries are ranked by these ratios, it is found that motor vehicles had both the greatest relative capital expansion and the highest rate of return on invested capital. Chemicals and electrical machinery ranked second and third in relative expansion and fourth and second in the rate of return. At the other extreme transportation equipment and both primary iron and steel and primary nonferrous metals had the lowest ratio of capital expenditures to 1948 gross fixed assets and, except for tobacco and rubber, the lowest rates of return on invested capital. Tobacco and paper products were the only industries showing significant deviations between the two ratios.

These observations are intended to be suggestive rather than definitive in view of the nature of the data. It is intended to do some further work along these lines, including an examination of sales and orders position in an attempt to determine industrial differences between postwar capital expansion and demand pressures on capacity.

Postwar investment by size of firm

Manufacturing companies with assets over \$100 million (in 1948) accounted for about 46 percent of total manufacturers' expenditures on plant and equipment during 1950. Corporations with assets between \$5 million and \$100 million expended 30 percent, the smaller corporations

spent 20 percent (with somewhat over half by the \$1 to \$5 million group), while noncorporate manufacturers accounted for the remaining 4 percent.

When investment trends are examined by size of firm it is found that all size groups experienced the same general movements during the postwar years—rapidly rising fixed investment in 1946 and 1947, slower rates of increase in 1948, declines in 1949, recovery in 1950, and substantial expansion in 1951. There were, however, significant differences among the size groups in the relative magnitude of the annual changes. These differences which are discussed below were found to be generally true within manufacturing industries.

Though there was little difference between the two largest size groups—\$5 million to \$100 million and \$100 million and over—in the year-to-year percentage changes, these larger firms differed substantially from the trends of corporations with assets under \$5 million. In both 1946 and 1947 the former groups expanded considerably more relatively than did the smaller firms. It is also interesting to note that there was a similar difference in behavior between companies with assets between \$1 million to \$5 million and those with assets under \$1 million. The relationship between size and relative capital expansion was generally reversed in 1948—with the larger firms showing the proportionally smaller rise in expenditures.

These results suggest that in 1946 and 1947 when supply was the major limiting factor, the larger firms were in a better position to obtain delivery of capital goods than were the smaller companies. As capital goods output increased and demand pressures by large manufacturers eased, the smaller corporations were better able to satisfy their deferred demands.

Capital outlays by the smaller firms declined proportionately more in 1949 and increased relatively more in 1950 than did those of the larger companies. These trends are probably due to the differential cyclical impact on various size groups of firms. It has generally been found that operations of the larger firms are less sensitive to changes

in activity than are the smaller firms. A special study of 1949 actual and anticipated capital outlays by manufacturers supports this conclusion in that year.

The study found that, among manufacturers reducing their 1949 capital spending more than one-fourth from earlier plans for that year, changes from expectations in sales and net earnings were given as the principal reason relatively more frequently by small firms than by large companies.²

Table 4.—Manufacturing Corporations: Percentage Changes in New Plant and Equipment Expenditures by Total Assets—Size¹

Year	Total assets also			
	Under \$1 million	\$1 million to \$5 million	\$5 million to \$100 million	\$100 million and over
	(Percentage change from previous year)			
1946	+17.8	+50.6	+61.0	+80.7
1947	+13.5	+20.5	+31.0	+33.9
1948	+15.3	+14.6	+3.6	+8.9
1949	-31.1	-18.4	-18.6	-21.8
1950	+8.0	+23.0	+4.2	+0.5
1951 ²	+39.4	+43.0	+32.4	+36.9

¹ Size based on assets as of the end of 1948.

² Based on actual expenditures through September 1951 and anticipated expenditures for the fourth quarter reported by business during late October and November.

Sources: U. S. Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

All sizes of firms contributed to the upsurge in capital expenditures following the outbreak of hostilities in Korea. However, the relative expansion from 1950 to 1951 by firms with assets over \$5 million was greater than that of companies with less than \$5 million of assets. While this was found to be true in most industries, the differences in the proportionate changes in capital outlays by size groups within industries were narrower than in the all-industry aggregates.

The greater spread in the aggregates was in part due to the emphasis at this stage of the mobilization program on increasing capacity in basic materials—fields where due to high capital requirements large companies predominate. In addition, allocations of scarce materials during the latter part of 1951 were more stringent in nondefense industries, such as apparel, furniture and lumber—areas weighted more heavily by the smaller firms. The effects of these factors are more clearly shown in the quarterly data (see table 5). Capital outlays by firms with assets under \$5 million reached their peak in the second quarter of 1951 and started to decline in the third quarter. Firms with over \$5 million of assets anticipate spending at record rates during the final quarter of 1951 (and in the first quarter of 1952).³

Industrial patterns in postwar investment

As can be seen in chart 2 and table 2 every major manufacturing industry underwent a substantial postwar expansion and modernization of productive facilities—with some variations in the magnitude and timing of these outlays. The variations in the early postwar years reflected the degree of participation in the war effort and other war influences as well as normal demand and technological factors. However, these special influences disappeared in the later postwar (but pre-Korean) period, and the variations seemed more closely related to sales, earnings, competitive conditions and

Table 3.—Manufacturing Corporations' Postwar Capital Expenditures and Gross Capital Assets, 1945¹

(Billions of dollars)

Industry	New plant and equipment expenditures 1946-51	Gross capital assets year-end 1945
Total manufacturing	46.1	52.1
Durable-goods industries	19.6	22.4
Basic and fabricated metals	7.3	11.4
Electrical machinery and equipment	1.7	1.2
Machinery except electrical	3.9	2.6
Transportation equipment including automobiles	4.6	3.7
Stone, clay and glass products	1.6	1.6
Other durable-goods industries ²	2.3	2.4
Non-durable-goods industries	26.5	29.1
Food and kindred products	3.4	4.0
Beverages	1.4	.9
Tobacco manufactures	.2	.3
Textile-mill products	3.0	2.7
Paper and allied products	2.1	2.1
Chemicals and allied products	5.4	4.2
Petroleum and coal products	10.3	12.0
Rubber products	.7	.9
Other non-durable-goods industries ³	1.9	2.1

¹ Gross capital assets as filed with the Bureau of Internal Revenue have been slightly adjusted in a few industries to conform with the latest Standard Industrial Classification. Data for the fourth quarter of 1951 are based on anticipated expenditures reported by business during late October and November. Data exclude capital outlays charged to current account.

² Include instruments, lumber, furniture, and miscellaneous.

³ Include apparel, leather and printing and publishing.

Sources: U. S. Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

² See "Business Investment Programs and their Realization," SURVEY OF CURRENT BUSINESS, December 1950.

³ These movements among the various size groups may be slightly affected by differences in seasonal patterns—especially in those quarters based on anticipatory data.

the many other variables usually determining producers' investment decisions.

These divergent trends may be more readily seen by examination of the data broken down by durable goods and nondurable goods industries. It should be noted that both of these aggregates contain "defense" and "nondefense" industries—although there was a greater concentration of "defense" industries in the durable goods category. From 1945 to 1946, outlays by durable goods industries almost doubled while those of the nondurable goods group were up somewhat more than 50 percent.

In part this reflected the greater demand pressures by both consumers and producers upon the durable goods industries. Equally important, these industries had to undergo by far the larger reconversion to peacetime products. A doubling of capital goods outlays from 1945 to 1946 was quite typical among the durable goods industries, while the expansion and replacement programs of primary iron and steel and electrical machinery brought 1946 outlays to two and one-half times those in 1945. The smallest increase in the group was about 50 percent in the "nonwar" lumber, furniture and miscellaneous group. Only the chemicals and paper industries among the nondurables as much as doubled—except for tobacco manufactures which increased almost four times from an extremely low figure in 1945.

With some of the most urgent demands met in 1946, new plant and equipment expenditures by durable goods manufacturers increased only 10 percent in 1947, while nondurable goods producers raised their investment rate by another 50 percent. Among the durables, only the primary metals producers showed significant increases in capital outlays, while declines occurred in professional and scientific instruments and motor vehicles—the latter reflecting the decision by major automobile producers to continue to produce their current models. In nondurables, on the other hand, every major industry expanded its rate of investment in 1947—and with the exception of rubber, leather and apparel, quite appreciably.

Capital outlays by both durable and nondurable goods industries increased only moderately in 1948—3 and 5 per-

cent, respectively—and then in 1949 every major industry curtailed its rate of installations. The only important changes in the investment rate during 1948 were appreciable increases in basic steel, petroleum, and textiles. Expenditures by the remaining industries were almost equally divided between small increases and declines.

Thus most industries in the pre-Korean years reached their peak rates of capital outlays in either 1947 or 1948—with some tendency for the consumers durable goods industries to reach their peak in the earlier year. Motor vehicles and other transportation equipment, instruments, and apparel attained their peaks in 1946. However, motor vehicles by mid-1950 had returned to peak rates of capital expenditures.

The declines in investment during 1949 were quite uniform with only a few industries outside the 20 to 25 percent range. The patterns for the full year 1950, however, were quite divergent. Investment by the durable goods industries increased by one-fifth with only primary nonferrous metals and nonautomotive transportation equipment not contributing to the rise. Capital outlays by nondurable manufacturers, on the other hand, declined almost 5 percent with only chemicals, paper, printing and publishing, and rubber products increasing their investment rates.

The annual data for 1950, however, obscure the significant change in investment programs within the year. The Korean outbreak resulted in a sharp upsurge in fixed investment by almost every industry and size-group of firms. As can be seen from the quarterly expenditures (table 5) by the fourth quarter of 1950 every industry except apparel and furniture was showing a rising investment trend, while most industries were achieving new peak rates. For the year as a whole only professional and scientific instruments were at peaks in capital outlays.

As can be seen in table 2, fixed investment in petroleum (and coal) totaled \$1.6 billion in 1950, or almost 21 percent of total manufacturers' outlays. The almost \$800 million of additions in chemicals was second in importance at 10 percent. Primary iron and steel, food, and motor vehicles accounted for 8, 7, and 7 percent, respectively, of the manufacturing total—while textiles and nonelectrical machinery

Table 5.—Manufacturers' Expenditures for New Plant and Equipment, Quarterly 1947-52, by Industry¹

(Millions of dollars)

Industries	1947				1948				1949				1950				1951				1952
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV ²	I ²
Total manufacturing.....	1,875	2,181	2,148	2,495	2,201	2,316	2,184	2,459	1,855	1,874	1,655	1,705	1,444	1,716	1,839	2,474	2,151	2,302	2,341	2,245	2,018
Durable-goods industries.....	746	896	823	939	731	890	871	941	673	646	600	615	567	704	772	1,092	821	1,250	1,363	1,698	1,533
Primary iron and steel.....	121	186	148	203	103	195	201	214	106	154	135	140	111	130	140	213	100	283	362	483	427
Primary nonferrous metals.....	34	50	40	48	46	48	50	48	34	35	40	43	35	27	35	43	45	82	70	135	125
Fabricated metal products.....	57	97	93	95	70	96	84	97	63	86	64	83	74	83	83	111	98	104	100	128	83
Electrical machinery and equipment.....	51	80	73	90	64	76	75	75	87	30	49	61	41	51	68	87	62	87	91	118	104
Machinery except electrical.....	127	135	128	134	124	130	134	139	100	97	89	96	85	90	95	141	121	149	181	187	132
Motor vehicles and equipment.....	123	135	105	142	122	109	105	134	78	85	86	100	68	115	141	185	136	192	246	293	(9)
Transportation equipment excluding motor vehicles.....	21	24	24	26	21	28	26	31	22	24	18	22	12	19	21	31	25	42	53	107	121
Stone, clay and glass products.....	66	83	82	80	57	73	62	77	45	47	38	51	44	65	72	99	75	96	100	107	(9)
Other durable-goods industries ³	103	120	118	121	117	135	131	127	101	99	81	99	95	120	136	177	172	213	209	170	130
Nondurable-goods industries.....	1,129	1,285	1,325	1,556	1,470	1,426	1,313	1,518	1,182	1,228	1,055	1,090	877	1,012	1,067	1,382	1,330	1,052	1,473	1,647	1,485
Food and kindred products.....	137	171	173	168	148	172	161	190	170	157	150	143	110	125	128	160	157	164	158	137	106
Beverages.....	50	69	71	91	83	90	87	72	71	87	64	50	60	63	69	69	78	82	72	60	45
Textile mill products.....	108	126	131	143	142	164	132	103	163	130	68	82	97	100	106	146	138	216	167	155	118
Paper and allied products.....	86	84	94	107	89	105	90	93	73	78	68	79	66	77	83	101	109	122	128	140	131
Chemicals and allied products.....	254	280	237	280	232	282	201	258	100	160	154	167	140	179	191	201	233	338	319	335	350
Petroleum and coal products.....	319	377	454	387	450	492	444	607	481	494	413	486	325	378	402	455	336	490	512	682	608
Rubber products.....	35	30	35	37	29	28	23	22	20	22	21	18	20	18	25	38	41	43	42	61	66
Other nondurable-goods industries ⁴	117	138	130	143	120	128	100	106	96	101	87	85	70	78	90	122	83	95	90	79	94

¹ Data exclude capital outlays charged to current account.

² Data for the fourth quarter of 1951 and the first quarter of 1952 are based on anticipated expenditures reported by business during the October and November.

³ Includes professional and scientific instruments, lumber, furniture and fixtures, ordnance and miscellaneous.

⁴ Includes tobacco products, apparel and related products, leather and leather products, and printing and publishing.

⁵ Data not available separately but are included in totals.

Sources: U. S. Dept. of Commerce, Office of Business Economics and Securities and Exchange Commission.

were the only other industries accounting for more than 5 percent of total manufacturing capital outlays in 1950. Among these industries in 1951, primary iron and steel and chemicals gained in relative importance, and petroleum and food declined to 18 and 6 percent, respectively, of the total.

Technical Notes

The annual estimates of manufacturers' expenditures for new plant and equipment presented here for the years 1945 through 1950 are based on mandatory annual reports by essentially all manufacturing corporations registered with the Securities and Exchange Commission and voluntary reports to the Office of Business Economics by a sample of non-registered manufacturers (both corporate and noncorporate). The quarterly estimates are interpolated and extrapolated by the same group of nonregistered companies and more than one-half of the registered companies which cooperate in the quarterly survey.

In aggregate, on an annual basis, the registered manufacturers in 1948 accounted for slightly over 60 percent of the assets of all manufacturing corporations as reported to the Bureau of Internal Revenue, while the OBE panel accounted for almost 6 percent (or somewhat over 14 percent of the nonregistered universe). The table shows the coverage of the sample in each industry for the year 1948.

Although these samples are not random in nature the corporate coverage of from 42 and 44 percent in textiles and fabricated metals to 92 and 94 percent in tobacco and automobiles are believed to impart a rather high degree of accuracy to the industries shown in table 2. The "other" durable and nondurable goods industry groups are subject to a substantial margin of error—especially the latter where the coverage of corporations in leather, apparel, and printing and publishing are 38, 11, and 15 percent, respectively. Furthermore, noncorporate outlays in the "other" durable and nondurable goods industries are larger relative to the total than in other manufacturing industries amounting to 18 percent in 1948. In the remaining industries, estimated outlays by noncorporate manufacturers are relatively greatest in food (8 percent) and beverages (6 percent) and are typically 1 or 2 percent in other areas.

The 1948 benchmark and estimates for other years

The universe estimates for 1948 were derived separately for registered and nonregistered companies for each industry stratified by 7 asset-size groups by applying the ratio of capital goods outlays to gross capital assets of the sample to the gross capital assets of the universe as measured by returns for the tax year 1948 to the Bureau of Internal Revenue. The industry, asset-size and gross capital assets for each reporting firm was determined by examination of the BIR transcript records. The resulting estimates were then adjusted upward to cover all corporations by the ratio of sales of all corporations to sales of corporations reporting balance sheets to BIR. This ratio in 1948 was 1.01 for all manufacturing corporations combined.

Thus these series in level, industry classification (the latest Standard Industrial Classification) and degree of consolidation are on a 1948 Statistics of Income base. With the exception of a few industries, the data are essentially on an unconsolidated basis. In aggregate, 425 manufacturers with total assets of \$17 billion out of a universe with \$122 billion of assets filed consolidated returns in 1948. On an industrial basis, however, 36 companies in petroleum and primary metals accounted for over \$14 billion, or 78 percent of the

Percentage of Total Corporate Assets Accounted for by Sample Companies, by Industries, 1948¹

INDUSTRIES	
Durable Goods	Percent
Total.....	66
Primary iron and steel.....	85
Primary nonferrous metals.....	86
Fabricated metal products.....	44
Electrical machinery and equipment.....	83
Machinery except electrical.....	58
Motor vehicles and equipment.....	94
Transportation equipment excluding motor vehicles.....	82
Stone, clay, and glass products.....	54
Professional and scientific instruments.....	64
Other:	
Lumber products, except furniture.....	18
Furniture and fixtures.....	18
Other industries, including ordnance.....	23
Nondurable Goods	
Total.....	65
Food and kindred products.....	57
Beverages.....	55
Tobacco manufacturers.....	92
Textile mill products.....	42
Paper and allied products.....	63
Chemicals and allied products.....	76
Petroleum and coal products.....	92
Rubber products.....	35
Other:	
Apparel and related products.....	11
Printing and publishing.....	15
Leather and leather products.....	38

¹ Based on total assets as reported to the Bureau of Internal Revenue in the 1948 tax year. No allowance has been made for corporations not reporting balance sheet data or for noncorporate firms.

Source: U. S. Department of Commerce, Office of Business Economics.

total assets of all corporations reporting on a consolidated basis.

In general, the noncorporate sample was considered inadequate to measure capital outlays by the noncorporate universe. Unincorporated business expenditures were therefore derived for each industry by applying the ratio of capital outlays to sales for corporations with assets under \$1 million to noncorporate universe sales. Noncorporate expenditures derived by this method in 1948 were about 4 percent of total outlays with about 60 percent concentrated in lumber, food, apparel, printing and publishing, and fabricated metal products.

Estimates for the years 1945 through 1947, 1949, and 1950 were based on capital outlays reported by the universe of registered manufacturers and extrapolations from 1948 by constant samples stratified by size within industries for the nonregistered companies. In those instances where the sample of nonregistered companies was considered inadequate, the samples were supplemented by the registered company data. Noncorporate expenditures for new plant and equipment in each industry were based on the investment trends within the same industry of corporations with assets of under \$1 million.

Adjustments were made in each year to correct the "constant-firm" samples for biases arising out of business births and deaths. These adjustments were based on information on business births and deaths by size of firm within manufacturing industries (available from the OBE's business population studies) and data on plant and equipment expenditures by new firms collected in a survey of investment by new manufacturing firms.¹

¹ See Revised Estimates of the Business Population, 1929-48, Survey, June 1949, and Capital Requirements of New Manufacturing Firms, Survey, April 1950.

The 1939 estimates are less reliable. They were derived by employing two basic methods of estimation in each industry and choosing the figure which conformed best with independent estimates described below. The first method simply extrapolated the 1947 estimates back to 1939 by use of the data in the 1939 and 1947 Census of Manufacturers with allowance for the change in industrial classification between the two Censuses. The second set of estimates was based on multiplying the gross fixed assets of all corporations (from the 1939 Statistics of Income, Part 2) by the ratio of plant and equipment expenditures to fixed assets among companies registered with the Securities and Exchange Commission. Allowance was made for noncorporate manufacturers by use of noncorporate sales data.

Two other sets of estimates were examined in order to aid in the selection of the final estimates. These consisted of Chawner's data,⁶ and estimates derived by adding 1939 depreciation and depletion charges to the changes in net tangible assets from the end of 1938 to the end of 1939 as shown in the 1938 and 1939 Statistics of Income.

Comparison with other series

It is the purpose of this section to briefly discuss the degree of comparability of these series with other series on investment and related data.

Although the present series utilize the same definitions and industry classification as those of the 1947 Census of Manufactures and the 1949 and 1950 Surveys of Manufactures, the use of company-wide rather than plant outlays results in differences in the estimates. The census data cover only manufacturing plants while the new series cover all establishments both manufacturing and nonmanufacturing owned by manufacturers and exclude manufacturing activities of companies engaged primarily in nonmanufacturing pursuits.

⁶ See Manufacturing Capital Expenditures, Survey, December 1941 and May 1942.

The net result of this difference in scope is that the new series in each major industry is higher than its census counterpart. These differences become especially large in those areas where consolidated reports to BIR are most prevalent. Thus petroleum and coal, primary metals and chemicals in 1947 account for \$1.6 billion of the \$2.3 billion excess in aggregate capital outlays over the 1947 census figure. In general, however, the industrial trends in the 1947-50 period are quite close in both the census and the new series. In aggregate, the 1949 and 1950 estimates in the latter series are 18 and 14 percent, respectively, lower than 1947. The corresponding census figures are 15 and 14 percent.

Reconciliation of the plant and equipment expenditures series with related construction and producers' durable equipment components of the gross national product must wait until completion of the revision of the nonmanufacturing segments of the former series. It may be repeated here that the gross product components differ conceptually primarily in their measurement of investment in automobiles, and in the inclusion of capital outlays charged to current account and outlays by farmers. These estimates generally use a commodity-flow approach and measure the output of all types of capital goods destined for use by domestic business. The OBE-SEC series measure expenditures by users for capital goods for which depreciation accounts are maintained.

The new series in classification and scope are directly comparable with the OBE's series on manufacturers' sales, orders and inventories as well as the Office's data on the number of manufacturing businesses. These new series differ from the national income series on corporate profits and entrepreneurial income by manufacturing industries primarily in that the latter series are still on the previous Standard Industrial Classification.

Relative to the Federal Trade Commission-Securities and Exchange Commission financial reporting series in manufacturing, the major difference arises out of the FTC-SEC use of a completely consolidated universe.

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